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November 16, 1992

VIA HAND DELIVERY

Ms. Donna R. Searcy
Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554
Stop Code 1170

RE: MM Docket No. 87-268

Dear Ms. Searcy:

Transmitted herewith on behalf of Cornell University, which manages and operates the Arecibo Observatory in Arecibo, Puerto Rico, under a Cooperative Agreement with the National Science Foundation, are an original and five (5) copies of its "Comments" in the above-referenced proceeding.

Should any question arise concerning this matter, please communicate with this office.

Very truly yours,

FLETCHER, HEALD & HILDRETH

Patricia A. Mahoney
Counsel for Cornell University

PAM/cla
Enclosures

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service	)	MM Docket No. 87-268
	)	
	)	
	)	
	)	

Directed to: The Commission

COMMENTS

Cornell University ("Cornell"), which manages and operates the Arecibo Observatory (the "Observatory") in Arecibo, Puerto Rico, under a Cooperative Agreement (AST-89-20849) with the National Science Foundation ("NSF"), by its attorneys, hereby respectfully submits its Comments in the above-referenced proceeding, in response to the Second Further Notice of Proposed Rule Making in this proceeding, Advanced Television Systems, 7 FCC Rcd 5376, 57 Fed. Reg. 38,652 (Aug. 26, 1992) ("SFNPRM"). Cornell's Comments include and are supported by the attached "Technical Statement Concerning the Adverse Impact of Advanced Television Allotments on Radio Astronomy Facilities in Puerto Rico and the Virgin Islands" ("Technical Statement").

In its SFNPRM, the Commission set forth proposed policies, procedures, and technical criteria to be used in allotting channels for advanced television (ATV) service. The Commission also published a "draft" proposal for an ATV Table of Allotments. As is

demonstrated in the attached Technical Statement, the Commission's proposals ignore the adverse effects its proposed ATV allotments will have on two major radio astronomy facilities -- the Arecibo Observatory at Arecibo, Puerto Rico, which is part of the National Astronomy and Ionosphere Center ("NAIC"), a federally-owned national research center operated by Cornell, and the National Radio Astronomy Observatory ("NRAO") site at St. Croix, Virgin Islands. To avoid harmful interference to the operations of these facilities, ATV channels 36, 38, 52, 53 and 54 must not be allotted to Puerto Rico or St. Croix. This should be an underlying principle as the Commission continues to work on the ATV Table of Allotments, for the reasons set forth in the attached Technical Statement.

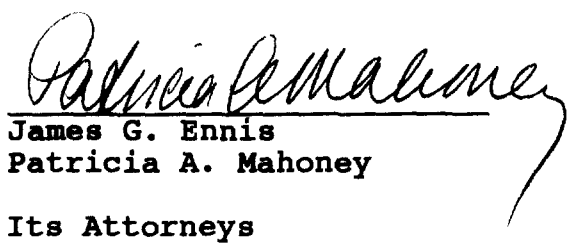
Also, as noted in the Technical Statement, on June 2, 1992, a Petition for Rulemaking was filed by the Committee on Radio Frequencies ("CORF") of the National Academy of Sciences, in which CORF requested that the Commission implement adjacent channel protection for the telescopes of the two national observatories, NRAO and NAIC, in the same manner that protection is afforded to conventional broadcasting stations. A copy of that Petition for Rulemaking is attached hereto as Exhibit 1 and incorporated herein by reference. As is explained in the Technical Statement, to ensure the effective use of the frequency band of Channel 37 for scientific observations at Arecibo and St. Croix, it is critical that the proposals made in the CORF Petition be adopted in drafting the ATV allotment table. Accordingly, for the reasons stated in

the Technical Statement, both the Arecibo Observatory and the St. Croix Very Long Baseline Array (VLBA) antenna should be treated as if they were Channel 37 facilities and should be protected under adjacent channel distance separation standards.

As the technical Statement demonstrates, the allotment of channels 36, 38, 52, 53, or 54 for ATV in Puerto Rico or St. Croix will likely cause harmful interference to the operations of two major radio astronomy facilities. The future of critical radio astronomy activities will be jeopardized if any of these channels is allotted to Puerto Rico or St. Croix.

Respectfully submitted,

CORNELL UNIVERSITY

By: 

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November 16, 1992

cla/PAM/8/P-Cornell

TECHNICAL STATEMENT CONCERNING THE ADVERSE IMPACT OF ADVANCED TELEVISION ALLOTMENTS ON RADIO ASTRONOMY FACILITIES IN PUERTO RICO AND THE VIRGIN ISLANDS

I. INTRODUCTION

This technical statement has been prepared on behalf of Cornell University by the undersigned in response to the Commission's Second Further Notice of Proposed Rule Making ("Notice") in Mass Media Docket No. 87-268. The Commission seeks comment on principles used to generate its sample table of allotments. As described herein, those principles currently ignore the adverse effects of advanced television ("ATV") allotments on two major radio astronomy facilities -- the Arecibo Observatory at Arecibo, Puerto Rico, and the National Radio Astronomy Observatory ("NRAO") site at St. Croix, Virgin Islands. To avoid harmful interference, ATV channels 36, 38, 52, 53 and 54 must not be allotted to Puerto Rico or St. Croix. This should be an underlying principle as the Commission continues work on the ATV table of allotments.

II. THE ARECIBO OBSERVATORY

The Arecibo Observatory is the world's largest radio telescope. It is located about 17 kilometers south of Arecibo, a city on the north coast of Puerto Rico, and is uniquely identified by the geographic coordinates of 18° 20' 46" north latitude and 66° 45' 11" west longitude. It is part of the National Astronomy and Ionosphere Center ("NAIC"), a federally-owned national research center operated by Cornell University under terms

of a cooperative agreement with the U.S. National Science Foundation ("NSF"). The telescope was constructed from 1960 to 1963 and was extensively upgraded from 1972 to 1974 for operation at shorter wavelengths. A further upgrade of the telescope for higher sensitivity and lower system temperatures is now underway.

The telescope operates 24 hours per day, year around. The Observatory is staffed with 132 persons in Puerto Rico and 12 persons in Ithaca, New York. It is publicly funded with an annual operating budget of $7.5 million supplied by the NSF and supplemented for planetary research by NASA.

The Arecibo Observatory reflector is 1000 feet in diameter, 167 feet deep and covers about 20 acres. The surface consists of 40,000 perforated aluminum panels supported by a network of steel cables strung across a natural sinkhole. The surface has been adjusted to an accuracy of less than 0.1 inch RMS over the entire 20 acres. A 600-ton receiver platform is suspended at 450 feet above the reflector surface with cables from three concrete towers. The platform consists of a supporting triangle and a movable bow-shaped azimuth arm with two suspended carriage (receiver) houses. In one carriage house is the 430 MHz line feed that is mostly used for ionospheric measurements. The second carriage house has six line feeds ranging in frequency from 1000 MHz to 2380 MHz that are used for spectral line radio astronomy and radar astronomy experiments. A new Gregorian subreflector system will replace the second carriage house and will operate from 300 MHz to 10 GHz. This upgrade project has been funded by the NSF and NASA for $22.8 million, and should be finished by Spring, 1994.

Research at Arecibo uses the most sensitive radio receivers in existence. The 21 cm wavelength (1420 MHz) system routinely detects radiation from galaxies with a flux density of 10^{-29} watts per square meter per hertz ($W/(m^2Hz)$). A single snowflake falling to the ground releases far more energy than is collected in a year's worth of observations. The equipment used at Arecibo is so sensitive it could detect the signal from a child's walkie-talkie a million miles away. The research capability of the telescope will increase further with the Gregorian upgrade, which will render the telescope 50 percent more sensitive and dramatically increase the frequency coverage of the telescope.

Basic research in radio astronomy, radar astronomy, and atmospheric science has put a heavy demand on the telescope resulting in an approved research proposal backlog of more than one year. With its powerful transmitters, sensitive receivers and sophisticated data acquisition and analysis equipment, the Observatory plays a leading role as a versatile research instrument in radiophysics.

III. THE ST. CROIX NRAO TELESCOPE

The St. Croix NRAO site is at 17° 45' 31" north latitude and 64° 35' 03" west longitude. It is used in connection with very long baseline interferometry ("VLBI") observations. VLBI observations began in the 1970s and their importance and frequency have increased steadily over the years. During the early development of VLBI there was much emphasis on using the highest practical frequencies to obtain the highest angular resolution. However, with the development of intercontinental baselines, the use of a wide range of frequencies has

become important. Observations of the 608-614 MHz band are being implemented with the Very Long Baseline Array ("VLBA"), which is now the primary VLBI array within North America.

The VLBA is an array of 10 antennas distributed across the U.S. from Hawaii to St. Croix and including the St. Croix NRAO site. Computer processing of data recorded at each of the 10 antennas enables scientists to construct images equivalent in detail to those that would be obtained with a single 8,000 kilometer antenna. Besides the 608-614 MHz band, the St. Croix NRAO facility will conduct observations in other bands, including 1400-1427 MHz.

IV. THE ALLOTMENT OF ATV CHANNELS 52, 53 OR 54 IN PUERTO RICO OR ST. CROIX WILL LEAD TO HARMFUL INTERFERENCE

Because of its high population concentration, Puerto Rico is second only to the northeast U.S. in terms of television station density. As the Notice states, Puerto Rico has more than half of the TV broadcasting channels (34 out of 67 channels) already allotted.[1] The small size of Puerto Rico does not permit frequency reuse, and many existing facilities are extremely short-spaced.

In the Commission's sample ATV table of allotments, ATV channel 53 was allotted to Arecibo, Puerto Rico.[2] While the Commission is not now seeking comments on specific conversion channel allotments in the draft table, the allotment of channel 53 suggests lack of

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[1] Notice at para. 53, n. 56.

[2] Notice, Appendix D, p. D-28.

consideration of radio astronomy protection in ATV allotment and assignment policy. The following discussion demonstrates how ATV stations operating on channels 52, 53 or 54 in Puerto Rico will cause harmful interference to the Arecibo Observatory due to harmonic interference.

Calculations of the field strength of the permitted harmonic radiation from a TV transmitter can be made using the Commission's rules and assuming no intervening terrain shielding. Footnote US74 of 47 CFR 2.106 states:

> In the bands . . . 1400-1427 MHz . . . the radio astronomy service shall be protected from extraband radiation only to the extent that such radiation exceeds the level which would be present if the offending station were operating in compliance with the technical standards or criteria applicable to the service in which it operates.

The second harmonics of channels 52, 53 and 54 fall in the 1400-1427 MHz band.

Section 73.687(e) of the Commission's rules states in part:

> As measured at the output terminals of the transmitter (including harmonic filters, if required) all emissions removed in frequency in excess of 3 MHz above or below the respective channel edge shall be attenuated no less than 60 dB below the visual transmitted power.

Calculations done by the engineering staff at the Observatory show that a 1500 kilowatt ATV station at channel 53 and at a distance of 50 km from Arecibo Observatory would have a broadband second harmonic power flux of about -97.7 dBm at 1414 MHz, calculated at 60 dB

below the fundamental.[3] However, CCIR document 224-7 defines the level of harmful interference in this band as -192 dBm. There is a discrepancy of approximately 94 dB between the harmonic emission levels allowed by the FCC and those considered harmful.[4]

This interference is not simply hypothetical. Today, interfering harmonic emissions in the 1400-1427 MHz band are being experienced at Arecibo Observatory from WCCV-TV, channel 54, Camuy, Puerto Rico. That station has been permitted to increase power to 1500 kilowatts and move to a location south of Arecibo Observatory and within direct line of sight to the Observatory. WCCV-TV has recently begun testing at its new location. Since the commencement of testing, the Observatory has been experiencing severe harmonic interference in the 1400-1427 MHz band -- a band where radio astronomy enjoys primary status.

This "minor change" by a TV station has become a major threat to the Observatory. Cornell University filed a Petition for Extraordinary Relief at the Commission regarding the interference potential from WCCV-TV.[5]

The problems posed by a channel 52, 53 or 54 ATV allotment will be similar to those now caused by the WCCV-TV upgrade. The second harmonic of channels 52 or 53

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[3]1414 MHz is the center frequency of the channel 53 second harmonic. 1500 kilowatts was chosen because it is the same power used under test by existing WCCV-TV, as discussed later in this statement.

[4]The Commission states in the Notice that it is possible that ATV stations will operate at power levels 10 dB less than existing stations (Notice at para. 18, n. 23). As can be seen from these predictions, a 10 dB reduction in interference is insignificant.

[5]Filed January 8, 1992.

would also fall in the 1400-1427 MHz band and, under 47 CFR 73.687(e), be allowed to be approximately 70 dB above what is considered by the CCIR to be harmful interference. Any interference in the 1400-1427 MHz band harms neutral hydrogen studies of the galaxy because the rest frequency of neutral hydrogen is blanketed, reducing the ability of the Observatory to study the structure of the galaxy and other nearby galaxies.

Because of the extreme sensitivity of the Arecibo Observatory, the allocation of ATV channels 52, 53 or 54 would likely cause harmonic interference problems if they were allocated to any city in Puerto Rico. Consequently, channels 52, 53 or 54 should not be used at all in the ATV allotment table for Puerto Rico.[6]

A similar argument can be made concerning the St. Croix NRAO telescope. To avoid harmful interference, ATV allotments on channels 52, 53 or 54 should not be made in St. Croix.

V. THE ALLOTMENT OF ATV CHANNELS 36 OR 38 IN PUERTO RICO OR ST. CROIX WILL LEAD TO HARMFUL INTERFERENCE

Channel 37 has been left unassigned by the FCC to allow radio astronomy observations in this 6 MHz spectral window. This continuum observing band is mostly used for flux measurements and for interferometric observations using unconnected antennas at great distances. The upgraded Arecibo Observatory and the dedicated interferometry antenna at St. Croix will use

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[6]In addition to considerations of harmonic interference, the high fields due to the fundamental signal of nearby terrestrial stations can cause intermodulation in highly sensitive receivers. This can occur regardless of the frequency of transmission.

this band often. However, no protection has been awarded to the radio astronomy observatories for the use of this band with regard to the separation rules customary for broadcasting services; i.e., no adjacent channel protection exists.

A Petition for Rulemaking has been filed by the Committee on Radio Frequencies ("CORF") of the National Academy of Sciences concerning the protection of channel 37.[7] The petition requests the implementation of adjacent channel protection for the telescopes of the two national observatories, NRAO and NAIC, in the same manner that protection is applied to conventional broadcasting stations. The Arecibo Observatory and the St. Croix NRAO telescope have been specifically mentioned in the petition.

To ensure the effective use of the frequency band of channel 37 for scientific observations at Arecibo and St. Croix, it is important that the proposals made in the CORF petition be followed when drafting the ATV allotment table. Specifically, both the Arecibo Observatory and the St. Croix VLBA antenna should be considered as if they were channel 37 facilities and protected under adjacent-channel distance separation standards.

Channels 36 and 38 are now allocated to Bayamon and San Sebastian, Puerto Rico, respectively.[8] In the

---

[7]Filed on June 2, 1992, placed on Public Notice October 14, 1992.

[8]WJWN-TV, channel 38, is licensed to San Sebastian, and is 45.1 kilometers from the Arecibo Observatory. WDWL, channel 36, holds a construction permit for operation at Bayamon, and is 68.4 kilometers from the observatory. Under 47 CFR 73.610(c)(1), the

proposed ATV rulemaking, channel 36 has not been assigned in Puerto Rico or the Virgin Islands, but channel 38 has been assigned to Christiansted, St. Croix, Virgin Islands. Using the Christiansted geographic coordinates from the National Atlas, the St. Croix NRAO facility is only 12.9 kilometers from Christiansted. This very short distance will likely result in harmful interference to the NRAO facility.

VI. CONCLUSION

Precluding the allotment of ATV channels 36, 38, 52, 53 and 54 in Puerto Rico and St. Croix is essential for preserving the future of critical radio astronomy activities. Both the Arecibo and St. Croix radio telescopes will be used extensively on those channels. Once interference shuts down part of the spectrum at these facilities, any sensitive observations at the affected frequencies are effectively eliminated. In the case of the Arecibo Observatory, no other telescope in the world can provide equivalent sensitivity.

Accommodation for the needs of the Arecibo Observatory and the St. Croix radio telescope in the ATV allotment table will prevent further interference problems such as those now experienced at Arecibo from WCCV-TV. An allocation of ATV channel 52, 53 or 54 in Puerto Rico will lead to interference even greater than already caused. The ongoing Gregorian Upgrading project at Arecibo Observatory will make the telescope more sensitive and more frequency agile, opening new frequency bands for

---

standard UHF-TV adjacent channel distance separation requirement is 87.7 kilometers.

research, and making protection from ATV interference all the more important.

Adjacent channel protection for channel 37 is essential for both the Arecibo Observatory and the St. Croix NRAO site. The channel 37 observing band will continue to be used for interferometric continuum measurements by both Arecibo Observatory and the St. Croix antenna.

The threat of interference from nearby transmitting facilities is an extremely serious issue. Loss of research capabilities at Arecibo due to TV broadcast interference is a permanent loss for the U.S. and the world, because no other telescope can serve as a replacement. Preservation of frequency bands and the suppression of interference are of the highest priority for the future of the Arecibo and St. Croix facilities, and should be a guiding principle in the Commission's further drafting of the ATV table of allotments.

Willem A. Baan

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November 12, 1992

EXHIBIT 1

NATIONAL RESEARCH COUNCIL
COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND APPLICATIONS
2101 Constitution Avenue Washington, D.C. 20418

BOARD ON
PHYSICS AND ASTRONOMY

(202) 334-3520
FAX: (202) 334-2791

June 2, 1992

Ms. Donna R. Searcy
Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Re: Gen. Docket No. _____
RM No.

In the Matter of

Amendment of Parts 73 and	)	RM - ____
74 of the Commission's	)	
Rules to Implement More	)	
Effectively Adjacent	)	
Channel Protection of	)	
Channel 37 and to Delete	)	
Channel 38 at Hilo, Hawaii	)	
from the Television Table	)	
of Allotments	)	

Dear Ms. Searcy:

Transmitted herewith by the National Academy of Sciences—National Research Council's Committee on Radio Frequencies are an original and nine (9) copies of its Petition for Rulemaking in the above-referenced proceedings.

If additional information is required concerning this matter, please communicate with this office.

Sincerely,

Ann Shapero for

Robert L. Riemer
Associate Director

Enclosure

BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 73 and 74 of the Commission's Rules to Implement More Effectively Adjacent Channel Protection of Channel 37 and to Delete Channel 38 at Hilo, Hawaii from the Television Table of Allotments	)	RM - _____

To: The Commission

PETITION FOR RULEMAKING

NATIONAL ACADEMY OF SCIENCES'
COMMITTEE ON RADIO FREQUENCIES

Dr. Frank Press, President

June ___, 1992

Direct correspondence to:

Dr. Robert L. Riemer
Committee on Radio Frequencies
National Research Council
HA-562
2101 Constitution Ave, N.W.
Washington, DC 20418

Please also serve:

James G. Ennis, Esq.
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1225 Connecticut Ave., N.W.
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Washington, DC 20036

SUMMARY

By this petition, the National Academy of Sciences' Committee on Radio Frequencies ("CORF") proposes that the Commission implement more effectively the adjacent channel protection to which radio astronomy sites conducting studies in the 608-614 MHz band (namely, Channel 37) are already entitled by: (1) incorporating into Part 73 of the Rules the locations of thirteen radio astronomy sites that currently or will make use of the 608-614 MHz band; (2) deleting Channel 38 at Hilo, Hawaii, from the Table of Allotments; and (3) amending Part 74 of the Rules so as to provide for protection of Channel 37 in terms of a mileage separation requirement.

Channel 37 has been reserved exclusively for the Radio Astronomy Service since 1963. Although the Commission intended to afford radio astronomy installations utilizing Channel 37 the same degree of adjacent channel protection as UHF-TV stations, they have not been afforded this protection because neither broadcasters nor the Commission knows where all thirteen of these radio astronomy sites are located. Insofar as low power television stations are concerned, the Channel 37 protection problem goes beyond a lack of awareness as to the location of radio astronomy sites because, even if a low power applicant knew these locations, the Part 74 rules require low power stations to protect UHF-TV stations in terms of their Grade B contour and

radio astronomy sites do not have Grade B contours. The proposed rule changes would rectify both of these problems.

The interference protection encompassed by the proposed rule changes is very limited in scope and would not unreasonably burden either full- or low-power UHF-TV broadcasters. First, only thirteen radio astronomy installations conducting studies in the 608-614 MHz band would be listed in the Table of Allotments.

Second, no existing broadcasters would be affected by these rule changes because any existing full- or low-power UHF-TV stations located within 54.5 miles of one of these radio astronomy sites would be grandfathered.

Third, there are only a few locations where the Table of Allotments provides for Channel 36 or 38 allotments within the vicinity of one of these thirteen telescopes and, of these allotments, only one allotment, which is currently vacant, would be deleted (Hilo, HI).

Fourth, since these radio astronomy sites are, for the most part, located in relatively remote, isolated areas and since the Part 74 rules give LPTV applicants the flexibility to propose use of any UHF channel between 14 and 69 (provided it meets the interference criteria), any LPTV applicant who wished to operate from a location within 54.5 miles of one of the affected sites would almost certainly have the ability to use a channel other than 36 or 38.

Finally, broadcasters would not incur any expense in terms of modifying facilities by, for example, adding filters because CORF

is asking only that Channel 37 be treated the same as any other UHF-TV channel in terms of adjacent channel protection.

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BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

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Rules to Implement More	)	
Effectively Adjacent	)	
Channel Protection of	)	
Channel 37 and to Delete	)	
Channel 38 at Hilo, Hawaii	)	
from the Television Table	)	
of Allotments	)	

To: The Commission

PETITION FOR RULE MAKING

The National Academy of Sciences' Committee on Radio Frequencies ("CORF"), pursuant to Section 1.401 of the Commission's Rules, hereby petitions the Commission to amend Sections 73.603, 73.606, and 74.703 of its Rules to implement more effectively the adjacent channel protection to which radio astronomy telescopes conducting studies in the 608-614 MHz band (i.e., Channel 37) are entitled and to delete Channel 38 at Hilo, Hawaii, from the Television Table of Allotments.

CORF represents the interests of radio astronomers as well as other passive users of the spectrum engaged in scientific research. "Passive" use of radio bands refers to the fact that radio astronomers do not transmit on the frequencies assigned to them; they only receive emissions on these frequencies.[1/] By carefully studying the intensity, frequency, position in the sky,

---

1/ The emissions or signals to which radio astronomers listen are extremely weak. A typical radio telescope receives only about one-trillionth of a watt from even the strongest cosmic source.

polarization, and variation with time of the radiation emitted by cosmic sources, radio astronomers can deduce information about the nature of the source of the radiation. Unlike active users of the spectrum, radio astronomers have no control over the frequencies that they need to use or the character of the "transmitted" signal. It is, therefore, not possible for radio astronomers to "relocate" their operations to another band in order to avoid interference from other spectrum users. Rather, with no control over the "transmitter," the radio astronomer must try to control the electromagnetic environment at the receiver. It is in this vein that CORF submits this Petition.

As explained below, CORF proposes that the Commission implement more effectively the adjacent channel protection to which radio astronomy sites using Channel 37 are already entitled by: (1) incorporating into Part 73 of the Rules the locations of thirteen radio astronomy sites that currently or will make use of the 608-614 MHz band;[2/] (2) deleting Channel 38 at Hilo, Hawaii, from the Table of Allotments; and (3) amending Part 74 of the Rules so as to provide for protection of Channel 37 in terms of a mileage separation requirement.

2/ As explained infra in Section III, one of the twelve sites is the Arecibo Observatory, another is the Very Large Array ("VLA") near Socorro, New Mexico, and the remaining ten are elements of the Very Long Baseline Array ("VLBA"). Both the VLA and the VLBA are operated by the National Radio Astronomy Observatory ("NRAO"). NRAO also operates the observatory at Green Bank, West Virginia, which also uses the 608-614 MHz band and is located in the National Radio Quiet Zone.

I. BACKGROUND

In 1963, the Commission adopted a Report and Order reserving Channel 37 for the Radio Astronomy Service on an exclusive basis throughout the United States for a period of ten years.[3/] This reservation was subsequently made permanent[4/] and is reflected in Rule Section 73.603(c), which provides:

> Channel 37, 608-614 MHz is reserved exclusively for the radio astronomy service.

The Channel 37 reservation for radio astronomy is also reflected in Part 74[5/] as well as the U.S. Table of Frequency Allocations.[6/] With respect to the level of adjacent channel protection afforded Channel 37 operations, the Commission stated in its 1963 Report and Order that:

> In commenting on the bandwidth required for a radiotelescope in this portion of the spectrum, one

---

3/ Report and Order, Docket No. 15022, 39 F.C.C. 884, 1 Rad. Reg. 2d (P&F) 1501 (1963).

4/ Order, 53 F.C.C. 2d 627 (1975)(Channel 37 reservation extended through WARC-79); Second Report and Order, Gen. Dkt. No. 80-739, 49 Fed. Reg. 2357 (Jan. 19, 1984) (amending Footnote US 246 to the U.S. Table of Frequency Allocations to implement domestically the WARC-79 reallocation of Channel 37 to the Radio Astronomy Service); Order, Mimeo 4358 (rel. May 12, 1986) (amending § 73.603(c) to reflect this reallocation).

5/ Rule Section 74.702(a)(2) provides:

> Any one of the UHF Channels from 14 to 69, inclusive, may be assigned to a UHF low power TV or TV translator station. In accordance with §73.603(c) of part 73, Channel 37 will not be assigned to such stations.

6/ Footnote US246, 47 C.F.R. §2.106 (US246), provides:

> No stations will be authorized to transmit in the bands 608-614 MHz . . .

> respondent stated ". . . it is to be strongly recommended that TV stations on adjacent channels be placed as far from the radio telescope as possible because of the danger of spurious radiation interference . . .". In this connection, it must be made quite clear that the Commission has no intention of placing any constraints upon the use of Channels 36 and 38 apart from those now applicable to all other UHF-TV channels in Part 3 of the Rules.[1/]

Apparently, therefore, the Commission intended to afford Channel 37 operations a level of protection that was no better, but also no worse, than that enjoyed by a television station operating on any other UHF-TV channel.

This interpretation is further borne out by the plain language of the Commission's Rules. Footnote US74 to the U.S. Table of Frequency Allocations, 47 C.F.R. §2.106, provides:

> In the bands . . . 608-614 [MHz] . . ., the radio astronomy service shall be protected from extraband radiation only to the extent that such radiation exceeds the level which would be present if the offending station were operating in compliance with the technical standards or criteria applicable to the service in which it operates.

In other words, radio astronomers conducting studies in the 608-614 MHz band are entitled to whatever degree of protection results from a television station operating in compliance with the technical standards of Parts 73 and 74.

In this connection, Rule Section 73.610(c)(1) provides:

> Minimum allotment and station adjacent channel separations applicable to all zones:
>
> (1) . . . Channels 14-69 87.7 kilometers (54.5 miles).

1/ 39 F.C.C. at 897-98 (emphasis added).